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Review Article

Systematic Review on Acupuncture for Treatment of Dysphagia after Stroke

Qiuping Ye,[1] Yu Xie,[2] Junheng Shi,[1] Zhenhua Xu,[2] Aihua Ou,[2] and Nenggui Xu[1]

[1]*Guangzhou University of Chinese Medicine, Airport Road, Baiyun District, Guangdong, Guangzhou 510006, China*
[2]*Guangdong Provincial Hospital of Chinese Medicine, Yide Road, Yuexiu District, Guangdong, Guangzhou 510006, China*

Correspondence should be addressed to Zhenhua Xu; xzh197011@163.com

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Objective. To assess the therapeutic efficacy of acupuncture for dysphagia after stroke. *Methods*. Seven electronic databases were searched from their inception until 31 September 2016. All randomized controlled trials (RCTs) incorporating acupuncture or acupuncture combined with other interventions for treatment of dysphagia after stroke were enrolled. Then they were extracted and assessed by two independent evaluators. Direct comparisons were conducted in RevMan 5.3.0 software. *Results*. 6010 patients of 71 papers were included. The pooled analysis of efficacy rate of 58 studies indicated that acupuncture group was superior to the control group with moderate heterogeneity (RR = 1.17, 95% CI: 1.13 1.21, $Z = 9.08$, and $P < 0.00001$); meta-analysis of the studies using blind method showed that the efficacy rate of acupuncture group was 3.01 times that of control group with no heterogeneity (RR = 3.01, 95% CI: 1.95 4.65, $Z = 4.97$, and $P < 0.00001$). Only 13 studies mentioned the safety evaluation. *Conclusion*. The result showed that the acupuncture group was better than control group in terms of efficacy rate of dysphagia after stroke. And the combining result of those researches using blind method was more strong in proof. Strict evaluation standard and high-quality RCT design are necessary for further exploration.

1. Introduction

Dysphagia was one of the most common sequelae after stroke. The incidence reached 81% [1]. There were many complications in dysphagia, such as cacotrophy [2], dehydration, aspiration, and pneumonia [3]. Those complications improve the morbidity, mortality, the rehabilitation, and the quality of life of the patients. So the medication and intervention time are very important for recovery. Acupuncture was an effective method and more and more welcomed and applied clinically [4]. There were many studies [5–7] about the acupuncture for treatment of dysphagia after stroke internationally, including the scalp acupuncture, nape needle, auricular needling, or combing with other methods.

Though, there were some systematic reviews focusing on the acupuncture for treatment of dysphagia in stroke. There was lack of higher quality research or the positive conclusion could not be obtained. Thus, the inclusion and exclusion criteria were formulated after integrating the previous relevant reports. And the studies using single blind method were pooled to be analysed alone.

2. Method and Data

The criterion of systematic review was published in the Cochrane Collaboration which was available on http://handbook.cochrane.org/.

2.1. Type of Studies. All articles were included that reported an RCT in patients with dysphagia after stoke. And the animal experiments were not inclusive.

2.2. Participants. All the patients should conform to the explicit clinical diagnosis criteria of stroke and dysphagia. They should meet the following diagnosis of stroke: (1) the diagnostic criterion of the Fourth National Conference on cerebrovascular diseases in 1994 or the revised diagnostic criterion in 1995 or 1996; (2) the revised "Various Types of Cerebrovascular Disease Diagnosis Points" of The Fourth National Conference on cerebrovascular diseases of Chinese Medicine Association; (3) the "Chinese Cerebrovascular Disease Prevention And Treatment Guidelines (Try Out)" established by Neurology Branch of Chinese Medical Association

Table 1: Retrieved literatures.

Database	CNKI	WanFang	CSJD	CBM	PubMed	EMBASE	Cochrane	SCI
Number	1361	1451	593	388	41	0	2	13

according to the 2005 or 2007 Disease Control Division; (4) 1996 Chinese Medicine Internal Medicine Association "criterion for evaluating curative effect of apoplexy"; (5) the guidelines for diagnosis and treatment of acute ischemic stroke composed by cerebrovascular branch of Neurology of Chinese Medical Association; (6) the guidelines for diagnosis and treatment of acute ischemic stroke in China 2010 Edition; (7) National Institutes of Health Stroke Scale (NIHSS) [8, 9]; (8) the therapeutic efficacy evaluation standard of TCM diagnosis for stroke; (9) confirmed by head CT or MRI and other imaging methods for stroke; (10) Summary of the Sixth National Conference on cerebrovascular diseases.

2.3. Interventions. For the intervention in acupuncture group, acupuncture alone or combined with other interventions was all included, such as the rehabilitation training, swallowing therapeutic apparatus, swallowing training, and electrical stimulation. There was no distinction for the acupuncture manipulation, acupoint, stimulation intensity, and course of treatment. It is available for blank control group, drugs, or rehabilitation training in control group.

2.4. Outcome Measurement. The clinical symptoms had obviously improved with specific evaluation criteria such as the (1) Watian Swallowing Test (WST) [10]; (2) Standardized Swallowing Assessment (SSA) [11]; (3) Ichiro Fujishima Rating Scale (IFRS) [12]; (4) Caiteng 7 Rank for dysphagia [13] or with using the objective index as the efficacy evaluation criterion, such as (1) video-fluoroscopic swallowing study [14]; (2) endoscopic evaluation of swallowing [15]; (3) fluorescence barium swallowing radiography score [16] which were recognized as swallowing assessment.

2.5. Information Sources and Search Strategy. We search the following electronic databases from their inception until September 30, 2016: Science Citation Index (SCI), Plumbed, The Cochrane Library, EMBASE, Chinese National Knowledge Infrastructure (CNKI), WanFang Database, Chinese Scientific Journals Database (CSJD), and Chinese Biomedical Literature Database (CBM). The searching terms include "stroke", "apoplexy", "cerebral hemorrhage", "acicula", "acupuncture", "impaired swallowing", and "dysphagia".

2.6. Data Extraction. Data were extracted independently by two authors (Qiuping Ye and Yu Xie) using a specifically designed data extracted form. The disagreements were solved by the third author's assistance (Junheng Shi) if necessary. The following information was extracted: (1) the first author, year of publication and the journal; (2) the research design; (3) the basic situation of the patients; (4) the inclusion and exclusion criteria; (5) the indicators of evaluation; and so on. After recording the reasons for exclusion, we got the flow diagram (see Table 1 and Figure 1) including 71 studies [17–87].

2.7. Quality Assessment. The methodological quality of each study was assessed from the following aspects: (1) random sequence generation; (2) allocation concealment; (3) blinding of participants and personnel; (4) blinding of outcome assessment; (5) incomplete outcome data; (6) selective reporting; (7) other bias and judging from "yes (low risk)," "no (high risk)," or "unclear (information is insufficient to evaluate)" and reporting the risk of bias graph (Figures 2 and 3).

3. Result

71 studies including 6010 patients were enrolled finally. There were 2991 participants in acupuncture group and 3019 participants in control group.

3.1. The Basic Characteristics. Two groups were compared statistically based on age, gender, duration, and degree of dysphagia. And the baseline was comparable. See Table 2; 12 studies used the complete random and allocation concealment; 10 studies used the single blind method in the outcome assessment and statistics analysis. For the incomplete outcome data, 12 studies reported the fall off and exit of patients without any effect on the result; 17 studies mentioned the funding support, and not the others.

3.2. Data Analysis. RevMan 5.3.0 software was used for data analysis. And the different outcome assessment indicators were used to be classified and analysed. They were presented as risk ratio (RR) or mean difference (MD) with a 95% confidence interval.

3.3. Efficacy Rate. 62 studies used the clinical efficacy rate as the evaluation indicator with the dichotomous data. So the risk ratio (RR) was used to show the result. We found the medium heterogeneity (I^2 = 68%) after combining data. We could observe from the funnel plot that 3 studies [19, 31, 82] had deviated from the center line. After sensitivity analysis, we found that one study [19] considered the significantly effective result as recovery and the other as invalidation, which led to difference in results. At the same time, the intervention group of the two studies [31, 82] was treated with acupuncture combined with western medicine. And the curative effect was significantly higher than that of the control group. All the dots were equally distributed on both sides of the dashed line in the funnel plot with no publication bias after removing them (Figure 4). The moderate heterogeneity was found after remerging (I^2 = 58%). So we chose the random effect model (Figure 5). The pooled analysis showed that the total rectangle was on the right of the equivalent line, which indicated the curative effect of acupuncture group was

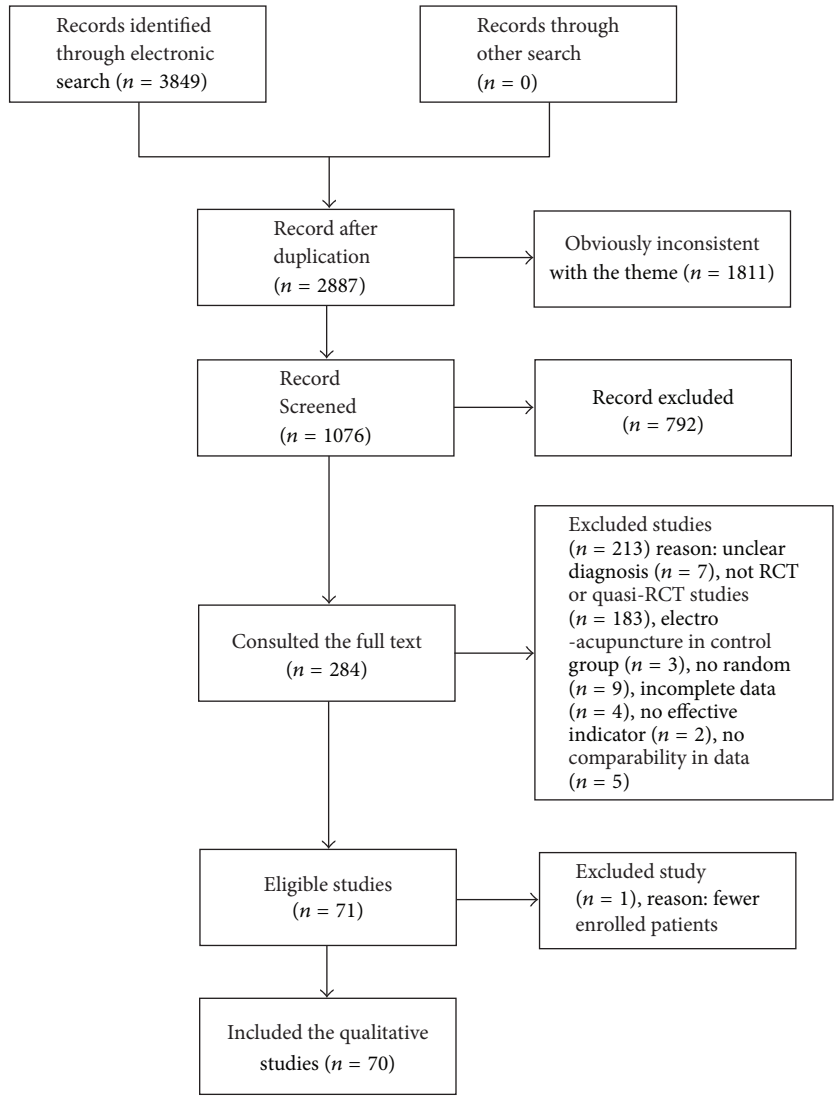

Figure 1: The screening flow diagram.

better than the control group (RR = 1.17, 95% CI: 1.13 1.21, $Z = 9.08$, and $P < 0.00001$).

3.4. Standard Swallowing Assessment (SSA). There were 11 studies that used the SSA as the effective evaluation standard with the continuous data. The meta-analysis of them was showed in mean difference with high heterogeneity ($I^2 = 83\%$). So the random effect model was used (Figure 6). The figure showed that acupuncture group could lower the SSA cores (MD = 3.7, 95% CI: −4.93 −2.48, $Z = 5.94$, and $P < 0.00001$).

3.5. Watian Swallowing Test. The Watian Swallowing Test was used in 24 studies; 9 of them used the dichotomous data. The risk ratio was selected to demonstrate the count data. The results (Figure 7) showed high heterogeneity ($I^2 = 87\%$). Hence the random effect model was used. And the rectangle was on the right of the equivalent line, which indicated that acupuncture group could improve the efficacy of dysphagia after stroke (RR = 1.25, 95% CI: 1.03 1.50, $Z = 2.31$, and $P = 0.02 < 0.05$).

15 studies used the continuous data. And the mean difference was applied. The results showed that the heterogeneity of the merger was large. So we did the subgroup analysis according to the course of disease. Then the heterogeneity decreased from 95% to 67.4% (Figure 8). There was no publication bias in the funnel plot (Figure 9). Meanwhile, the pooled analysis showed that the acupuncture could lower the Watian Swallowing Test score (MD = 0.97, 95% CI: −1.11 −0.47, $Z = 4.82$, and $P < 0.00001$).

3.6. Swallowing Functional Assessment. Among the included studies, 8 of them used the Swallowing Functional Assessment to evaluate the effectiveness of treatment with the continuous data. The result (Figure 10) exhibited the medium heterogeneity ($I^2 = 65\%$) with mean difference (MD). The result explained that acupuncture could improve the

Figure 2: The bias of each study.

swallowing function with the random effect model (MD = 1.48, 95% CI: 1.18 1.79, $Z = 9.59$, and $P < 0.0001$).

3.7. Swallowing Disorder Integral. 5 studies selected the swallowing disorder scoring as evaluated standard. The meta-analysis of the 5 dichotomous data sets showed that the heterogeneity decreased from 85% to 40% after removing one study [59]. The sensitivity analysis indicated that the heterogeneity might be the treatment course of this study which was longer than the others. We could see from the figure that the score of the control group was higher than the acupuncture group (Figure 11). It illustrated that acupuncture group was able to lower the swallowing disorder integral (MD = −0.71, 95% CI: −1.08 −0.33, $Z = 3.7$, and $P = 0.0002$).

3.8. Swallowing-Related Quality of Life (SWAL-QOL). 5 studies used the SWAL-QOL to express the Swallowing-Related Quality of Life before and after treatment. They all used the continuous data and mean difference to exhibit the results. The pooled analysis showed that rectangle was intersected with the equivalent line with high heterogeneity ($I^2 = 100\%$), which means nothing (Figure 12).

3.9. Activities of Daily Living (ADL). 2 studies [67, 78] used ADL to express the curative effect, two [27, 45] used the Barthel index, and the other one [54] used modified Barthel index. Among them, the activities of daily living before and after treatment were showed using the continuous data and mean difference. The meta-analysis indicted that acupuncture group obviously improved the activities of daily living of the patients with lower heterogeneity ($I^2 = 22\%$) (Figure 13). And it was 7.31 times as much as the control group (MD = 7.46, 95% CI: 5.49 9.47, $Z = 7.31$, and $P < 0.0001$).

3.10. Caiteng 7 Rank (CT7R). The CT7R was used in 2 studies [48, 87] with dichotomous and risk ratio. There was no heterogeneity ($I^2 = 0\%$) after combining the data with the fixed effect model (Figure 14), which indicated that the Caiteng 7 Rank scores of the acupuncture group were higher than the control group (RR = 1.22, 95% CI: 1.04 1.42, $Z = 2.49$, and $P = 0.01$).

The pooled analysis (Figure 15) of the 2 studies [44, 56] using Ichiro Fujishima Rating Scale (IFRS) showed no meaning with medium heterogeneity ($I^2 = 69\%$), neither the result of 2 studies [17, 45] using mini-nutritional assessment (MNA). Only one study [54] used Hamilton Depression Scale (HAMD), which showed that the depression degree of acupuncture group was lighter than the control group.

3.11. Blind Method Analysis. We extracted 7 studies using blind method from the enrolled studies, among which 4 studies used the clinical therapeutic efficiency and 5 used Watian Swallowing Test efficacy rate. There was no heterogeneity ($I^2 = 0\%$) after pooling them with dichotomous data and risk ratio (RR) (Figure 16). So the fixed effect model was used. The rectangle was on the right of equivalent line and the therapeutic efficiency of acupuncture group was 3.01 times

Figure 3: The summary of bias evaluation for the studies.

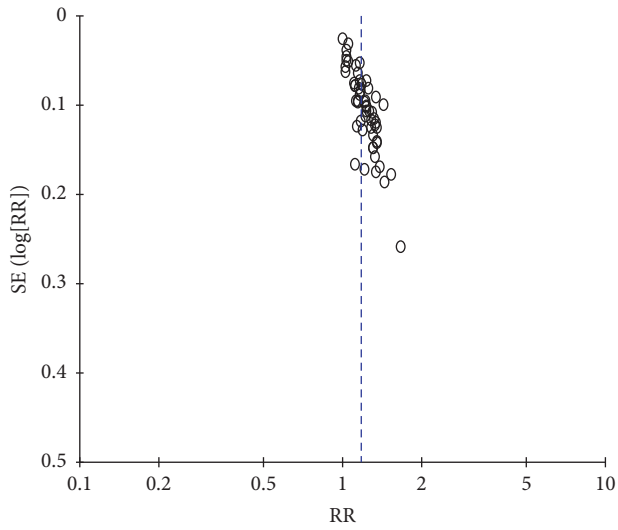

Figure 4: The funnel plot of clinical efficacy rate.

as much as the control group. The result indicated that the acupuncture group could improve the therapeutic efficiency of dysphagia after stroke (RR = 3.01, 95% CI: 1.95 4.65, Z = 4.97, and $P < 0.00001$).

Among the studies employing blind method, 4 of them used the SSA as the assessment indicator with continuous data and mean difference (MD). High heterogeneity was found after combined analysis. Sensitivity analysis revealed that heterogeneity might be due to the use of the test method and the gender imbalance in the clinical cases from one study [17]. The heterogeneity was lower (I^2 = 21%) after removing it. We could see from the figure (Figure 17) that the rectangle was on the left of equivalent line, with a trend that acupuncture group could lower the SSA scores (MD = −4.47, 95% CI: −6.59 −3.36, Z = 7.85, and $P < 0.00001$).

3.12. Adverse Reactions Report. Only 13 studies mentioned the security index, including how to prevent the subcutaneous hemorrhage, needle sickness, curved needle, broken needle, and the handing method during acupuncture process. Meanwhile, some studies reported the influence caused by the adverse reactions, not the others.

4. Discussion

The study indicated that the therapeutic efficacy of acupuncture or acupuncture combined with other intervention was better than the control group, though some pooled results had higher heterogeneity. The interventions such as the acupuncture, rehabilitation training, and swallowing training were related to the professional skill of the practitioners, the same as the efficacy evaluation. Meanwhile, the various source of cases might lead to difference statistic results.

4.1. Comparison with Other Literatures. The acupuncture alone or combined with other interventions is widely used for dysphagia after stroke in China. There exists some evidence about the acupuncture for dysphagia after stoke. One report [88] stated although acupuncture had a tendency to improve dysphagia after stroke, it could not get the positive conclusion. There was report [89] which indicated that acupuncture combined with the swallowing rehabilitation training had certain advantage. Long and Wu [90] pointed out that acupuncture may be benefit for dysphagia, but high-quality research was needed. The present study reworked out inclusion and exclusion criteria to evaluate the efficacy of acupuncture for treatment of dysphagia after stroke and showed stronger evidence in the result.

4.2. Strengths and Limitations. In this paper, the studies included single blind method pooled to analysis alone and showed stronger evidence on acupuncture for treatment of dysphagia after stroke. We incorporated all researches in the past 5 years. Considering the clinical application of the intervention in this paper was special, such as the feeling of the patient. It was difficult to achieve true double blind. The studies using single blind method achieved the blind method to some extent. There was no or lower heterogeneity after combining.

Table 2: The basic characteristic of the included studies.

Reference	Simple size T/C (M/F)	Design/blind	Diagnostic criteria	Intervention	Control	Mean age (T/C)	Treatment course	Outcome measures
Luo et al. [17] 2015	33/29	RCT/single blind	FNCOCD-1994	A + BT + RT	BT + RT	68.45 ± 9.73/66.90 ± 11.55	38.82 ± 48.77/27.14 ± 47.30	SSA + MNA
Xia et al. [18] 2015	62 (35/27)/62 (36/26)	RCT/single blind	NIHSS	A + ST	ST	65.3 ± 14.2/66.1 ± 14.3	NR	SSA + DOSS
Xie et al. [19] 2011	70 (39/31)/70 (28/32)	RCT/single blind	FNCOCD-1994	A	BT + RT	66.0 ± 8.4/68.4 ± 9.1	64.7 ± 32.0/60.0 ± 36.0	WST
Yin et al. [20] 2011	18 (10/8)/25 (11/9)	RCT/single blind	FNCOCD-1994	A + ST + ES	ST + ES	69.52 ± 6.01/65.41 ± 7.01	25.60 ± 3.09/24.32 ± 2.78	WST + IFRS
Zhang et al. [21] 2014	29 (9/22)/31 (8/21)	RCT/single blind	RFNCOCD-1994	A + TCM + RT	BT + RT	65.55 ± 7.05/62.21 ± 8.37	42.56 ± 14.26/45.12 ± 12.56	VFSS + WST
Wang [22] 2016	30 (18/14)/30 (17/13)	RCT/single blind	RFNCOCD-1994	A + BT + ES	BT + RT	63.81 ± 8.445/64.87 ± 9.228	43.69 ± 18.39/42.0 ± 18.134	WST + SSA + SWAL-QOL
Li and Bai [23] 2015	32 (22/10)/30 (20/10)	RCT/single blind	RFNCOCD-1994	A + BT + RT	BT + RT	55.17 ± 4.73/54.97 ± 5.46	NR	WST
Liu [24] 2014	34/34	RCT/single blind	GFDTAISC-2010	A + BT + RT	BT	61.65 ± 8.253/63.71 ± 7.112	4.56 ± 4.294/4.18 ± 4.159	WST
Hang et al. [25] 2014	39 (16/23)/39 (19/20)	RCT/single blind	RFNCOCD-1994	A + BT + OPT	BT	56.36 ± 10.55/56.36 ± 10.55	17.36 ± 15.52/19.49 ± 16.91	SSA
Li et al. [26] 2009	30/30 NR	RCT/single blind	FNCOCD-1995	A + RT	RT	NR	NR	SSA
Zhu et al. [27] 2012	82 (59/23)/82 (53/29)	RCT/no blind	FNCOCD-1995	A + SUG	SUG	60.8/62.4	NR	WST + NIHSS + Barthel
Chen and Zhang [28] 2016	30 (16/14)/30 (20/10)	RCT/no blind	CCDPATGBNBCMA-2007	A + RT	RT	61.63 ± 10.87/60.90 ± 10.53	47.68 d/41.63 d	WST
Chen et al. [29] 2014	168 (117/5)/171 (131/4)	RCT/no blind	SOSNCOCD-2004	A + RT + BT	BT + RT	64.40 ± 11.20/64.05 ± 11.35	35.29 ± 32.84/33.12 ± 29.12	WST + TIFRS
Wang [30] 2013	30 (16/14)/30 (15/15)	RCT/no blind	FNCOCD-1996	A + BT + TCM	BT	65.3 ± 8.2/66.4 ± 5.4	14.98 ± 13.02/15.79 ± 13.76	SSA
Duan [31] 2014	40 (24/16)/40 (25/15)	RCT/no blind	FNCOCD-1994	A + SM + BT	BT	52.5 ± 3.7/52.5 ± 3.7	NR	WST
Bao and Zou [32] 2015	30 (21/9)/30 (22/8)	RCT/no blind	FNCOCD-1997	A + WM	WM	68.40 ± 7.166/68.77 ± 6.606	48.80 ± 23.57/50.03 ± 24.33	WST
Fan et al. [33] 2007	30 (13/17)/30 (14/16)	RCT/no blind	RFNCOCD-1996	A + WM	WM	67.76 ± 4.34/68.03 ± 4.05	46.37 ± 25.34/47.18 ± 26.15	WST
Feng et al. [34] 2016	30 (18/12)/30 (19/11)	RCT/no blind	GFDTAISC-2010	A + RT + BT	BT + RT	60 ± 12/58 ± 22	38 ± 18/39 ± 18	WST + VFSS
Zhen et al. [35] 2012	30 (16/14) 30 (13/17)	RCT/no blind	FNCOCD-1996	A + BT	BT	61 ± 3/60 ± 3	7 d–10 m/6 d–10 m	WST
Chang et al. [36] 2014	38 (27/11)/36 (28/8)	RCT/no blind	RFNCOCD-1996	A + ES + BT	ES + BT	46 ± 10/44 ± 11	16.6 ± 4.8/17.3 ± 5.2	IFRS
Wu et al. [37] 2011	80 (54/26)/75 (52/23)	RCT/no blind	TEESTCMDFS-1996	A + BT + ST	BT + ST	68/66	NR	WST

Table 2: Continued.

Reference	Simple size T/C (M/F)	Design/blind	Diagnostic criteria	Intervention	Control	Mean age (T/C)	Treatment course	Outcome measures
Zhang and Yin [38] 2012	62 (32/30)/56 (22/34)	RCT/no blind	RFNCOCD-1995	A + BT + ST	BT + ST	70 ± 2/68 ± 2	30.86 ± 12.72/31.78 ± 11.23	MBSAS + WST + DRS
Chen [39] 2008	30 (19/11)/30 (17/13)	RCT/no blind	TEESTCMDFS-1997	A + BT	BT	42–79/40–81	NR	WST
Mao et al. [40] 2015	40 (22/18)/40 (21/19)	RCT/no blind	FNCOCD-1995	A + RT + BT	RT + BT + SDTA	63.64/62.9	56.2 ± 7.239/54.8 ± 6.033	VFSS
Guo and Li [41] 2016	40 (23/17)/40 (25/15)	RCT/no blind	FNCOCD-1997	A + BT	BT + ST	55.28 ± 10.34/56.12 ± 11.47	21.19 ± 8.28/20.49 ± 9.15	SSA
Gao et al. [42] 2016	40 (24/16)/40 (22/18)	RCT/no blind	FNCOCD-1994	A + ST	ST	57.8 ± 4.9/58.2 ± 5.1	NR	WST
Bai [43] 2016	40 (16/24)/40 (15/25)	RCT/no blind	FNCOCD-1994	A + SDTA	SDTA	63.34 ± 9.04/63.15 ± 9.24	NR	WST
Song [44] 2012	30 (19/11)/30 (20/10)	RCT/no blind	CCDPATGBNBCMAG-2005	A + ST + BT	ST + BT	61.3/61.52	2.26 m/2.09 m	WST + IFRS
Zhou et al. [45] 2014	30 (19/11)/30 (20/10)	RCT/no blind	CCDPATGBNBCMA-2005	A	RT	65.63 ± 9.33/64.35 ± 8.26	NR	WST + MNA + Barthel
Liu [46] 2014	45 (28/17)/42 (27/15)	RCT/no blind	FNCOCD-1996	A + ST	ST	52.3 ± 8.7/53.6 ± 8.5	NR	WST
Li et al. [47] 2013	30 (20/10)/30 (21/9)	RCT/no blind	FNCOCD-1996	A + BT + ST	BT	56.9 ± 4.6/57.1 ± 3.7	NR	WST
Wang [48] 2011	30 (18/12)/30 (16/14)	RCT/no blind	FNCOCD-1995	A + BT	BT	56.5/56.8	6–35 d/7–34 d	WST
Liu and Zheng [49] 2014	33 (17/16)/31 (14/17)	RCT/no blind	FNCOCD-1996	A + BT	BT	61.7/59.8	NR	WST
Gu [50] 2011	35 (22/13)/35 (23/12)	RCT/no blind	FNCOCD-1996	A + RT + BT	BT + RT	71.98 ± 10.19/70.74 ± 11.58	14.69 ± 15.76/17.11 ± 15.52	CT7R
Gao et al. [51] 2014	52 (31/21)/49 (27/22)	RCT/no blind	CCDPATGBNBCMA-2007	A + BT + SDTA	BT + SDTA	60.25 ± 8.36/61.37 ± 7.36	NR	WST
Chen [52] 2016	30 (17/13)/30 (18/12)	RCT/no blind	FNCOCD-1995	A + BT + RT	BT + RT	62.90 ± 10.04/63 ± 9.83	NR	VFSS + Rosenbek
Ruan et al. [53] 2015	25 (12/13)/25 (14/11)	RCT/no blind	CCDPATGBNBCMA-2005	A + BT + ST	BT + ST	58.01 ± 10.74/57.98 ± 11.82	47.02 ± 7.47/46.87 ± 6.96	IFRS
Wang [54] 2015	46 (35/11)/45 (31/14)	RCT/no blind	FNCOCD-1997	A + BT	RT + BT	61 ± 10/64 ± 10	54.63 ± 27.18/51.93 ± 23.10	WST + SSA + SWAL-QOL + HAMD + MBI
Li et al. [55] 2015	65 (47/18)/65 (49/16)	RCT/no blind	FNCOCD-1996	A + BT	BT	63.87 ± 5.24/63.96 ± 5.33	2.32 ± 1.79/3.38 ± 1.90	WST + IFRS
Zhang et al. [56] 2011	30/30	RCT/no blind	FNCOCD-1995	A + ST	ST	NR	NR	WST
Qu [57] 2009	30 (17/13)/30 (18/12)	RCT/no blind	FNCOCD-1997	A + RT	RT	69.06 ± 6.67/66.84 ± 10.39	27.27 ± 13.76/27.30 ± 8.11	WST
Chen and Lin [58] 2016	60 (38/22)/60 (41/19)	RCT/no blind	RFNCOCD-1996	A + RT	RT	65/63	9–40 d/10–38 d	WST
Gao and Zhu [59] 2015	30/30 (30/30)	RCT/no blind	FNCOCD-1996	A + BT	BT	45–75	5–45 d	WST
Liu et al. [60] 2012	36 (22/14)/36 (25/11)	RCT/no blind	FNCOCD-1994	A + BT	BT	57.6 ± 8.2/58.5 ± 8.7	35.4 ± 6.5/34.8 ± 7.1	WST
Dong et al. [61] 2014	30 (16/14)/30 (17/13)	RCT/no blind	FNCOCD-1995	A + RT	RT	63/62	35/36	WST
Zhang [62] 2014	50 (28/22)/46 (26/20)	RCT/no blind	FNCOCD-1996	A + BT + NEST	RB + BT	67.5 ± 7.2/68.2 ± 6.4	8.8 ± 1.2/9.6 ± 1.4	WST

Table 2: Continued.

Reference	Simple size T/C (M/F)	Design/blind	Diagnostic criteria	Intervention	Control	Mean age (T/C)	Treatment course	Outcome measures
Li et al. [63] 2014	20 (11/9)/20 (12/8)	RCT/no blind	FNCOCD-1995	A + BT + ST +	BT + ST	60.4 ± 4.6/61.3 ± 4.2	15.3 ± 2.7/14.7 ± 2.1	WST + OFS
Wang and Yang [64] 2013	45 (20/25)/45 (21/24)	RCT/no blind	FNCOCD-1995	A + ST + BT	ST + BT	61.33 ± 4.19/61.61 ± 5.34	29.12 ± 7.09/31.41 ± 6.32	WST
Ding and Zhang [65] 2013	30 (17/13)/30 (19/11)	RCT/no blind	FNCOCD-1994	A + BT	BT	63.14 ± 7.28/62.47 ± 6.91	27.2 ± 7.5/28.6 ± 7.9	WST
Fang [66] 2014	30 (16/14)/30 (15/15)	RCT/no blind	FNCOCD-1996	A + BT + CMPPS	BT + ST	52.8 ± 6.9/53.9 ± 6.0	34.1 ± 15.3/31.4 ± 12.6	WST
Qin [67] 2015	30 (26/4)/30 (21/9)	RCT/no blind	RFNCOCD-1995	A + BT	RT + BT	61.42 ± 13.65/63.86 ± 10.83	34.99 ± 8.75/31.18 ± 7.21	WST + SSA + ADL
S. Zhang and G. M. Zhang [68] 2014	87 (64/23)/87 (58/29)	RCT/no blind	CCDPATGBNBCMA-2007	A + RT	RT	63.86 ± 10.55/64.61 ± 9.70	28.45 ± 23.42/31.48 ± 27.80	WST + IFRS
Zhu and Zhao [69] 2015	30 (18/12)/30 (16/14)	RCT/no blind	TEESTCMDFS-1996	A + BT	RT	53.60 ± 12.96/56.10 ± 10.81	6.83 ± 1.60/7.05 ± 1.33	WST
Fu [70] 2016	53 (30/23)/48 (28/20)	RCT/no blind	FNCOCD-2007	A + RT + BT	RT + BT	52.8 ± 10.4/55.4 ± 13.8	6.8 ± 2.3/8.5 ± 3.1	SSA + SWAL-QOL
Zhang et al. [71] 2007	110 (67/43)/110 (62/48)	RCT/no blind	RFNCOCD-1995	A + RT	RT	53.16 ± 6.84/51.37 ± 8.63	NR	WST
Wei and An [72] 2012	50 (34/16)/50 (36/14)	RCT/no blind	CCDPATGBNBCMA-2005	A + BT + RT	BT	57.8/57.7	3–45/4–46	WST
Yin [73] 2013	57 (32/25)/56 (30/26)	RCT/no blind	RFNCOCD-1996	A + RT + BT	RT + BT	62.5 ± 6.5/60.8 ± 7.4	11.5 ± 2.2/10.3 ± 1.3	SSA + SWAL-QOL
Huang et al. [74] 2011	28 (16/12)/28 (15/13)	RCT/no blind	FNCOCD-1995	A + RT	RT	38–75/38–73	15 d–6 m/18 d/5 m	WST
Chen et al. [75] 2011	28 (12/16)/28 (13/15)	RCT/no blind	FNCOCD-1995	A + ST + NEST	ST	57.71 ± 9.17/59.50 ± 8.79	50.21 ± 21.59/49.14 ± 20.76	WST
Wang and Cui [76] 2011	70 (49/12)/70 (52/18)	RCT/no blind	FNCOCD-1996	A + LFPT + BT	BT	66.12/64.87	65.4/71.1	WST
Li [77] 2016	36 (23/13)/36 (24/12)	RCT/no blind	FNCOCD-1997	A + BT + AM	BT	52.98 ± 4.93/53.61 ± 4.81	13.65 ± 5.25/12.53 ± 6.16	WST
Yi [78] 2014	30 (19/11)/30 (18/12)	RCT/no blind	CCDPATGBNBCMA-2010	A + SUMM	SUMM	62.03 ± 10.14/63.90 ± 8.64	66.23 ± 47.94/70.23 ± 44.36	SSA + ADL
Jia et al. [79] 2014	30 (23/7)/30 (21/9)	RCT/no blind	FNCOCD-1995	A + RT	RT	58.30 ± 7.87/56.47 ± 8.43	<6 M	WST
Huang et al. [80] 2013	30 (17/13)/30 (16/14)	RCT/no blind	FNCOCD-1995	A	TCM	65 ± 3/67 ± 2	109 ± 4/108/9	WST
Feng and Sun 2016 [81]	30/30	RCT/no blind	FNCOCD-1996	A	BT	NR	NR	WST
Chen et al. [82] 2015	30/30	RCT/no blind	FNCOCD 1995	A + BT + ST	BT + ST	NR	NR	IFRS
Feng et al. [83] 2015	45 (32/13)/45 (29/16)	RCT/no blind	FNCOCD-1995	A + BT + LFES	LFES + BT	63.12/52.36	56.52/45.12	WST
Yu and Hu [84] 2012	40 (23/17)/38 (20/18)	RCT/no blind	FNCOCD-1995	A + RT + BT	RT + BT	62.51 ± 10.17/62.51 ± 10.17	13.78 ± 2.62/14.56 ± 2.48	WST
Zhao and Zhang [85] 2012	94 (48/46)/92 (47/45)	RCT/no blind	FNCOCD-1995	A + STA	STA	59.78/60.03	NR	WST
Yu et al. [86] 2012	30 (19/11)/30 (13/17)	RCT/no blind	FNCOCD-1995	A + BT	BT	54.30 ± 11.5/55.50 ± 10.7	30.25 ± 10.53/31.12 ± 8.92	WST
Zheng [87] 2014	30 (21/9)/30 (23/7)	RCT/no blind	FNCOCD-1994	A + ST	ST	68.3 ± 13.84/70.26 ± 11.97	43.37 ± 24.37/44.30 ± 22.52	CT7R + SSA + VFSS + WST

(1) Diagnosis: FNCOCD, the diagnostic criterion of the Fourth National Conference on cerebrovascular diseases in 1994 or the revised diagnostic criterion in 1995 or 1996; FNCOCD the revised diagnostic criterion in 1995 or 1996; CCDPATGBNBCMA, the "Chinese Cerebrovascular Disease Prevention And Treatment Guidelines (Try Out)" established by Neurology Branch of Chinese Medical Association according to the 2005 or 2007 Disease Control Division; GFDTAISC2010, the guidelines for diagnosis and treatment of acute ischemic stroke in China 2010 Edition; NIHSS, National Institutes of Health Stroke Scale; TEESTCMDFS, the therapeutic effect evaluation standard of TCM diagnosis for stroke; SOSNCOCD, summary of the Sixth National Conference on cerebrovascular diseases. (2) Measures: CT7R, Caiteng 7 Rank; MBSAT, medical bedside swallowing assessment scale; DRS, dysphagia rank scale; WST, Watian Swallowing Test; SSA, standard swallowing assessment; VFSS, videofluoroscopy; IFRS, Ichiro Fujishima Rating Scale; ADL, Activity of Daily Life; WALQOL, Swallowing-Related Quality of Life; DSS, dysphagia severity scale; OFS, oral function score. (3) Intervention: SM, swallowing mixture; A, acupuncture; RT, rehabilitation; BT, basic treatment; SUMM, stroke unit management model; ST, swallowing treatment; SUG, stroke unit group; ES, electrical stimulation; TCM, traditional Chinese medicine; WM, Western medicine; OPT, oral positioning therapy; AM, acupoint massage; NEST, neuromuscular electrical stimulation; MS, muscle electrical stimulation; LPT, low frequency pulse electrotherapy; ES, electrical stimulation; SDTA, swallowing disorder therapeutic apparatus; CMPPS, cold medicine Popsicle pharyngeal stimulation; IS, ice stimulation; NR, no report.

Study or subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	Risk ratio M-H, random, 95% CI
Wei and An 2012	46	50	40	50	2.1%	1.15 [0.98, 1.35]
Li 2016	33	36	29	36	1.8%	1.14 [0.94, 1.37]
Zhu and Zhao 2015	25	30	18	30	0.8%	1.39 [1.00, 1.94]
Li et al. 2013	29	30	26	30	2.2%	1.12 [0.95, 1.30]
Li and Bai 2015	27	32	19	30	0.9%	1.33 [0.98, 1.82]
Song 2012	26	30	20	30	1.0%	1.30 [0.97, 1.74]
Chen et al. 2014	159	168	154	171	3.4%	1.05 [0.99, 1.12]
Fan et al. 2007	26	30	9	30	0.0%	2.89 [1.64, 5.08]
Liu 2014	30	34	23	34	1.2%	1.30 [1.00, 1.70]
Ruan et al. 2015	24	25	21	25	1.8%	1.14 [0.95, 1.38]
Liu 2014	42	45	32	42	1.8%	1.23 [1.02, 1.48]
Yi 2014	26	30	23	30	1.3%	1.13 [0.89, 1.44]
Liu et al. 2012	29	36	19	36	0.8%	1.53 [1.08, 2.16]
Bai 2016	40	40	35	40	2.6%	1.14 [1.01, 1.29]
Chen 2016	29	30	26	30	2.2%	1.12 [0.95, 1.30]
Li et al. 2009	24	30	18	30	0.8%	1.33 [0.95, 1.88]
Zhang et al. 2011	20	30	12	30	0.4%	1.67 [1.00, 2.76]
Gu 2011	34	35	33	35	2.9%	1.03 [0.93, 1.14]
Chang et al. 2014	38	38	36	36	3.5%	1.00 [0.95, 1.05]
Chen and Zhang 2016	30	30	29	30	3.0%	1.03 [0.94, 1.13]
Jia et al. 2014	29	30	23	30	1.6%	1.26 [1.02, 1.55]
Yin 2013	49	57	39	56	1.7%	1.23 [1.01, 1.51]
Huang 2011	27	28	20	28	1.3%	1.35 [1.06, 1.72]
Chen et al. 2011	23	28	16	28	0.7%	1.44 [1.00, 2.07]
Wang and Cui 2011	63	70	44	70	1.7%	1.43 [1.18, 1.74]
Li et al. 2015	60	65	48	65	2.1%	1.25 [1.06, 1.47]
Gao et al. 2014	48	52	44	49	2.6%	1.03 [0.91, 1.16]
Wu et al. 2011	67	75	50	75	1.9%	1.34 [1.12, 1.60]
Liu 2014	31	33	22	31	1.3%	1.32 [1.04, 1.68]
Wang 2016	28	32	22	30	1.3%	1.19 [0.93, 1.54]
Wang 2015	43	46	36	45	2.0%	1.17 [0.99, 1.38]
Fu 2016	47	53	33	48	1.6%	1.29 [1.04, 1.60]
Zhang and Yin 2012	60	62	44	56	2.3%	1.23 [1.07, 1.42]
Zhang et al. 2014	30	31	21	29	1.4%	1.34 [1.06, 1.69]
Dong et al. 2014	27	30	20	30	1.1%	1.35 [1.02, 1.79]
Gao et al. 2016	39	40	37	40	2.9%	1.05 [0.95, 1.17]
Zhen et al. 2012	29	30	24	30	1.8%	1.21 [1.00, 1.46]
Feng et al. 2016	26	30	20	30	1.0%	1.30 [0.97, 1.74]
S. Zhang and G. M. Zhang 2014	83	87	80	87	3.2%	1.04 [0.96, 1.12]
Yu et al. 2012	28	30	23	30	1.5%	1.22 [0.98, 1.52]
Feng et al. 2015	42	45	38	45	2.3%	1.11 [0.95, 1.28]
Feng and Sun 2016	27	29	21	29	1.3%	1.29 [1.01, 1.64]
Wu 2013	23	30	19	30	0.8%	1.21 [0.86, 1.69]
Chen and Lin 2016	55	59	48	60	2.3%	1.17 [1.01, 1.35]
Huang et al. 2013	27	30	23	30	1.4%	1.17 [0.93, 1.48]
Wang 2011	28	30	25	30	1.8%	1.12 [0.93, 1.35]
Duan 2014	37	40	30	40	1.7%	1.23 [1.01, 1.51]
Bao and Zou 2015	25	30	8	30	0.0%	3.13 [1.69, 5.78]
Wang and Yang 2013	45	45	40	45	2.8%	1.12 [1.01, 1.25]
Guo and Li 2016	36	40	28	40	1.4%	1.29 [1.02, 1.61]
Qin 2015	29	30	22	30	1.4%	1.32 [1.05, 1.65]
Xie et al. 2011	37	65	20	65	0.0%	1.85 [1.21, 2.82]
Zhao and Zhang 2012	90	94	76	92	2.9%	1.16 [1.05, 1.28]
Zhang 2014	44	50	33	46	1.6%	1.23 [1.00, 1.51]
Fang 2014	29	30	25	30	1.9%	1.16 [0.98, 1.38]
Yu and Hu 2011	34	40	24	38	1.1%	1.35 [1.02, 1.77]
Yin et al. 2011	15	18	15	20	0.9%	1.11 [0.80, 1.54]
Mao et al. 2015	38	40	37	40	2.7%	1.03 [0.92, 1.15]
Zhu et al. 2012	72	82	61	82	2.2%	1.18 [1.02, 1.37]
Total (95% CI)		*2420*		*2389*	*100.0%*	*1.17 [1.13, 1.21]*
Total events	2219		1844			

Heterogeneity: $\tau^2 = 0.01$; $\chi^2 = 129.46$, df = 55 ($P < 0.00001$); $I^2 = 58\%$

Test for overall effect: $Z = 9.08$ ($P < 0.00001$)

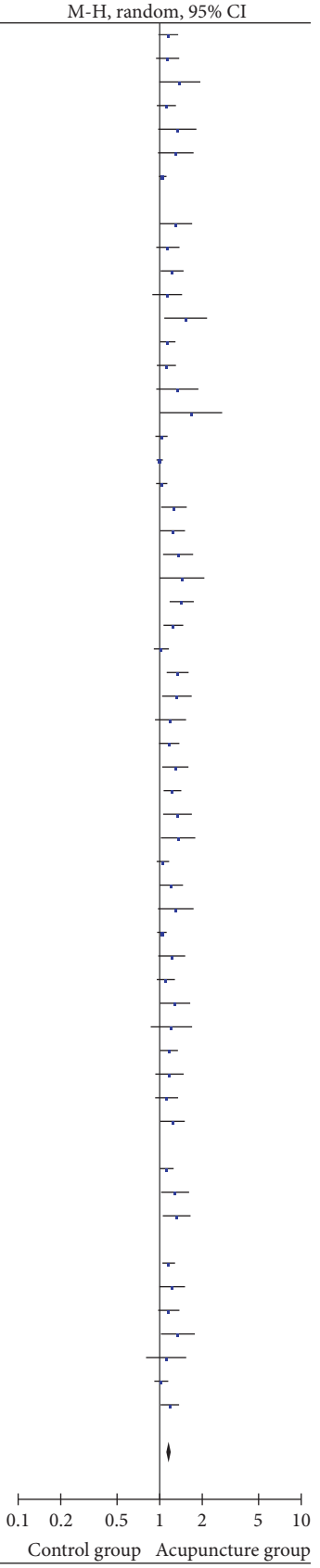

Figure 5: The forest diagram of the clinical efficacy rate.

Study or subgroup	Experimental Mean	Experimental SD	Experimental Total	Control Mean	Control SD	Control Total	Weight	Mean difference IV, random, 95% CI
Yi 2014	28.5	7.6	30	31.1	5.71	30	6.3%	−2.60 [−6.00, 0.80]
Zheng 2014	23.2	4.56	30	25.57	4.69	30	8.5%	−2.37 [−4.71, −0.03]
Hang et al. 2014	18.95	1.57	39	23.79	2.6	39	11.4%	−4.84 [−5.79, −3.89]
Luo et al. 2015	21.7	3.1	33	23.45	3.25	29	10.2%	−1.75 [−3.34, −0.16]
Yin 2013	23.65	2.3	57	26.59	3.1	56	11.3%	−2.94 [−3.95, −1.93]
Wang 2016	23.03	2.559	32	27.93	6.648	30	8.0%	−4.90 [−7.44, −2.36]
Wang 2015	21.63	2.88	46	23	3.62	45	10.7%	−1.37 [−2.72, −0.02]
Fu 2016	21.4	2.8	53	27.5	3	48	11.1%	−6.10 [−7.24, −4.96]
Xia et al. 2015	27.5	7.33	62	30.25	6.39	62	8.3%	−2.75 [−5.17, −0.33]
Wu 2013	26.72	3.35	30	29.57	3.63	30	9.8%	−2.85 [−4.62, −1.08]
Guo and Li 2016	28.01	8.38	40	40.09	11.79	40	4.6%	−12.08 [−16.56, −7.60]
Total (95% CI)			*452*			*439*	*100.0%*	*−3.70 [−4.93, −2.48]*

Heterogeneity: $\tau^2 = 3.18$; $\chi^2 = 59.56$, df = 10 ($P < 0.00001$); $I^2 = 83\%$

Test for overall effect: $Z = 5.94$ ($P < 0.00001$)

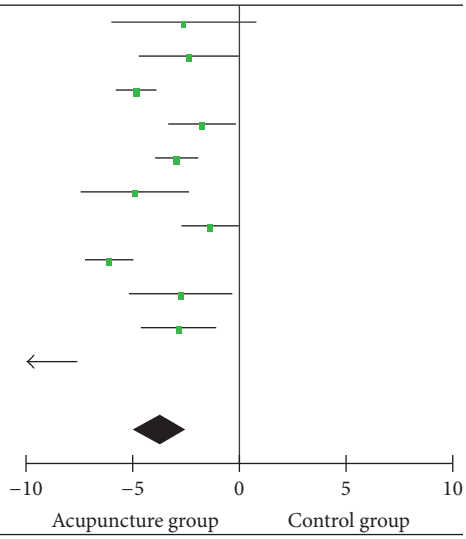

Figure 6: The forest diagram of SSA effective rate.

Study or subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	Risk ratio M-H, random, 95% CI
Liu 2014	30	34	23	34	11.0%	1.30 [1.00, 1.70]
Zheng 2014	28	30	23	30	11.8%	1.22 [0.98, 1.52]
Qu 2009	26	30	22	30	11.1%	1.18 [0.91, 1.53]
Chen 2008	28	30	18	30	10.2%	1.56 [1.14, 2.12]
Zhang et al. 2007	108	110	106	110	14.0%	1.02 [0.97, 1.07]
Gao and Zhu 2015	30	30	25	30	12.7%	1.20 [1.01, 1.42]
Xie et al. 2011	37	65	20	65	8.2%	1.85 [1.21, 2.82]
Yin et al. 2011	15	18	20	25	10.6%	1.04 [0.78, 1.38]
Zhou et al. 2014	25	30	20	30	10.3%	1.25 [0.93, 1.69]
Total (95% CI)		*377*		*384*	*100.0%*	*1.25 [1.03, 1.50]*
Total events	327		277			

Heterogeneity: $\tau^2 = 0.06$; $\chi^2 = 62.15$, df = 8 ($P < 0.00001$); $I^2 = 87\%$

Test for overall effect: $Z = 2.31$ ($P = 0.02$)

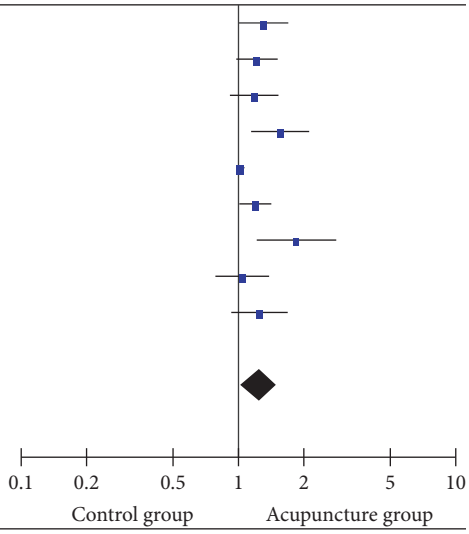

Figure 7: The forest diagram of WST effective rate.

On the outcome indicator of the dysphagia, most of the studies used the Watian Swallowing Test, SSA, Fujishima Rating Scale, and so on. Only 5 studies [21, 38, 50, 72, 87] used the golden standard-videofluoroscopy (VFSFF) [91] as the assessment indicator. The Watian Swallowing Test was put forward by the Toshio Watian from Japan, which was used as preliminary screening for dysphagia. Meanwhile, it was dependent on the feeling of patients and susceptible to them, which made the inconsistencies with most results in clinical and laboratory inspection [92, 93]. However, it was classified clearly and simply to use. So it was employed in many researches clinically [18, 21, 23]. Therefore, the choice of evaluation criteria needs to be more rigorous and scientific in the clinical trial design. In order to increase the reliability, high level evaluators should be chosen to evaluate the efficacy for dysphagia simultaneously.

However, there were several limitations of this review. Some research used the acupuncture combined with other interventions on the basic of the control group. And it was easily mixed with the effect of the acupuncture. Therefore, for experiment group, acupuncture alone or combined with

Study or subgroup	Experimental Mean	SD	Total	Control Mean	SD	Total	Weight	Mean difference IV, random, 95% CI
2.2.1. 28 d WST								
Wang 2015	2	1	46	3	1	45	7.1%	−1.00 [−1.41, −0.59]
Subtotal (95% CI)			*46*			*45*	*7.1%*	*−1.00 [−1.41, −0.59]*
Heterogeneity: not applicable								
Test for overall effect: $Z = 4.77$ ($P < 0.00001$)								
2.2.2. 20 d WST								
Zhang and Yin 2012	1.6	1.06	62	2.2	1.15	56	7.1%	−0.60 [−1.00, −0.20]
Feng et al. 2015	1.58	0.25	45	2.73	0.22	45	8.0%	−1.15 [−1.25, −1.05]
Wang and Yang 2013	1.79	0.61	45	2.9	0.24	45	7.8%	−1.11 [−1.30, −0.92]
Qin 2015	8.49	1.52	30	6.13	1.94	30	5.0%	2.36 [1.48, 3.24]
Subtotal (95% CI)			*182*			*176*	*27.9%*	*−0.39 [−0.97, 0.19]*
Heterogeneity: $\tau^2 = 0.30$; $\chi^2 = 66.03$, df = 3 ($P < 0.00001$); $I^2 = 95\%$								
Test for overall effect: $Z = 1.33$ ($P = 0.18$)								
2.2.3. 24 d WST								
Gao et al. 2014	2.71	0.84	52	3.01	0.89	49	7.4%	−0.30 [−0.64, 0.04]
Subtotal (95% CI)			*52*			*49*	*7.4%*	*−0.30 [−0.64, 0.04]*
Heterogeneity: not applicable								
Test for overall effect: $Z = 1.74$ ($P = 0.08$)								
2.2.4. 4 w WST								
Song 2012	1.56	0.82	30	2.06	0.87	30	7.0%	−0.50 [−0.93, −0.07]
Chen and Zhang 2016	1.33	0.661	30	1.83	0.874	30	7.2%	−0.50 [−0.89, −0.11]
Gao et al. 2016	1.4	1.11	40	2.38	0.97	40	6.9%	−0.98 [−1.44, −0.52]
Guo and Li 2016	1.24	0.29	40	2.97	0.21	40	8.0%	−1.73 [−1.84, −1.62]
Fang 2014	1.71	1.59	30	5.12	2.07	30	4.8%	−3.41 [−4.34, −2.48]
Subtotal (95% CI)			*170*			*170*	*33.8%*	*−1.34 [−2.08, −0.60]*
Heterogeneity: $\tau^2 = 0.64$; $\chi^2 = 81.93$, df = 4 ($P < 0.00001$); $I^2 = 95\%$								
Test for overall effect: $Z = 3.57$ ($P = 0.0004$)								
2.2.6. 1 w WST								
Fang 2014	5.03	2.31	30	5.34	1.89	30	4.2%	−0.31 [−1.38, 0.76]
Subtotal (95% CI)			*30*			*30*	*4.2%*	*−0.31 [−1.38, 0.76]*
Heterogeneity: not applicable								
Test for overall effect: $Z = 0.57$ ($P = 0.57$)								
2.2.7. 60 d WST								
S. Zhang and G. M. Zhang 2014	1.85	1.04	87	2.08	0.96	87	7.5%	−0.23 [−0.53, 0.07]
Subtotal (95% CI)			*87*			*87*	*7.5%*	*−0.23 [−0.53, 0.07]*
Heterogeneity: not applicable								
Test for overall effect: $Z = 1.52$ ($P = 0.13$)								
2.2.8. 2 m WST								
Duan 2014	2.4	0.4	40	3.2	0.8	40	7.6%	*−0.80 [−1.08, −0.52]*
Subtotal (95% CI)			*40*			*40*	*7.6%*	*−0.80 [−1.08, −0.52]*
Heterogeneity: not applicable								
Test for overall effect: $Z = 5.66$ ($P < 0.00001$)								
2.2.9. 3 w WST								
Fang 2014	3.78	1.88	30	5.14	2.08	30	4.5%	*−1.36 [−2.36, −0.36]*
Subtotal (95% CI)			*30*			*30*	*4.5%*	*−1.36 [−2.36, −0.36]*
Heterogeneity: not applicable								
Test for overall effect: $Z = 2.66$ ($P = 0.008$)								
Total (95% CI)			*637*			*627*	*100.0%*	*−0.79 [−1.11, −0.47]*
Heterogeneity: $\tau^2 = 0.33$; $\chi^2 = 284.98$, df = 14 ($P < 0.00001$); $I^2 = 95\%$								
Test for overall effect: $Z = 4.82$ ($P < 0.00001$)								
Test for subgroup differences: $\chi^2 = 21.47$, df = 7 ($P = 0.003$), $I^2 = 67.4\%$								

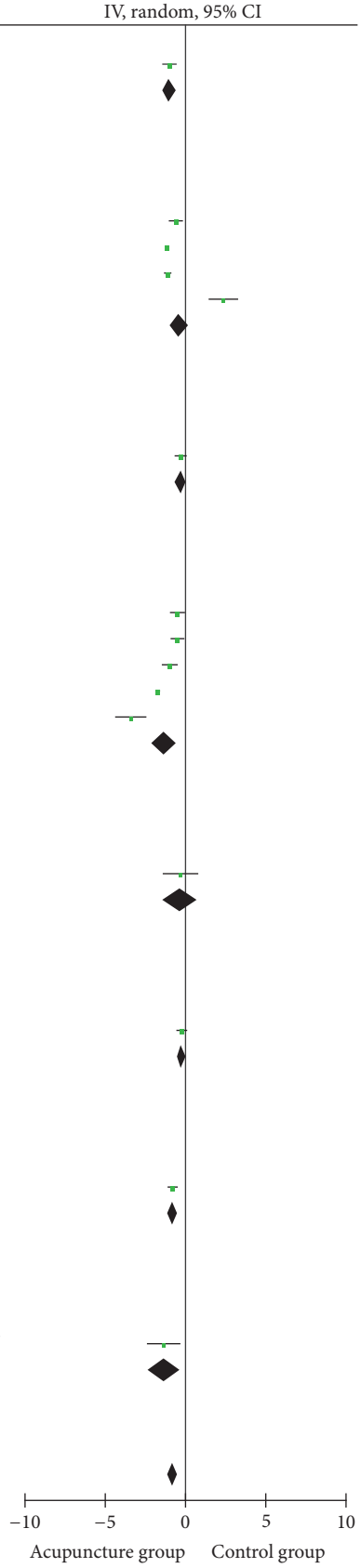

Figure 8: The forest diagram of WST subgroup analysis.

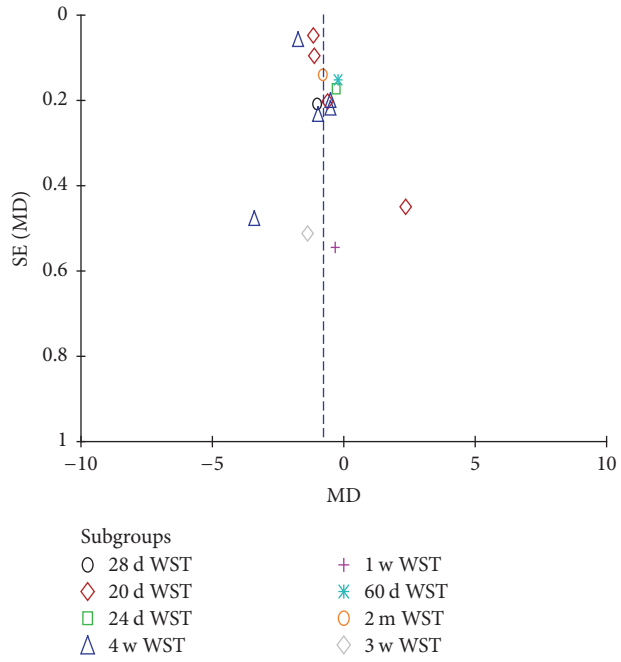

Figure 9: The funnel of WST subgroup analysis.

Study or subgroup	Experimental			Control			Weight	Mean difference	Mean difference
	Mean	SD	Total	Mean	SD	Total		IV, random, 95% CI	IV, random, 95% CI
Chang et al. 2014	8.01	1.25	38	6.73	1.36	36	11.2%	1.28 [0.68, 1.88]	
Gao et al. 2014	5.58	1.25	52	4.76	1.12	49	13.6%	0.82 [0.36, 1.28]	
Chen et al. 2015	7.85	0.7	30	5.86	0.72	30	15.5%	1.99 [1.63, 2.35]	
Zhang and Yin 2012	6.73	1.16	62	5.25	1.25	56	14.1%	1.48 [1.04, 1.92]	
Chen and Lin 2016	7.38	1.35	30	5.72	1.06	30	10.9%	1.66 [1.05, 2.27]	
Qin 2015	7.38	1.72	30	5.74	1.35	30	8.5%	1.64 [0.86, 2.42]	
Zhang 2014	7.13	1.25	50	5.97	1.09	46	13.5%	1.16 [0.69, 1.63]	
Yu and Hu 2011	8.97	1.04	40	7.13	1.25	38	12.7%	1.84 [1.33, 2.35]	
Total (95% CI)			*332*			*315*	*100.0%*	*1.48 [1.18, 1.79]*	

Heterogeneity: $\tau^2 = 0.12$; $\chi^2 = 20.08$, df = 7 ($P = 0.005$); $I^2 = 65\%$

Test for overall effect: $Z = 9.59$ ($P < 0.00001$)

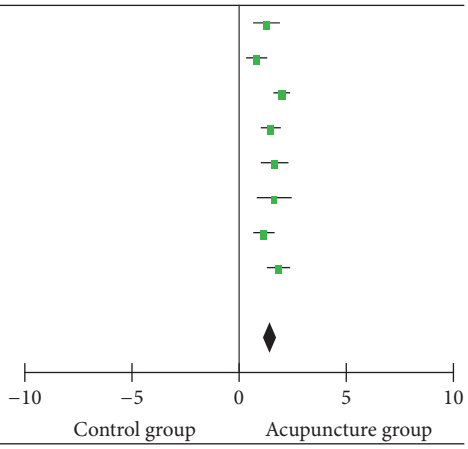

Figure 10: The forest diagram of swallowing function.

the interventions of the control group might increase the reliability.

Some studies [94, 95] showed that acupuncture seemed to be safe in the subacute phase of ischemic stroke and cardiac arrhythmia. Others [96] indicated that the safety of acupuncture needs further evidence. And some researches [97, 98] show that the occurrence of the adverse events during acupuncture was closely related to the competency of the practitioners and the safety system of acupuncture. However, in the process of literature retrieval, we found that most of the literatures included in this paper paid too much attention to the validity of acupuncture and ignored the influence of adverse event during acupuncture. Therefore, we should consider the security issues in the research design. The unfinished trials caused by the security issues should be reported perfectly according to international standard [99] to ensure the data's integrity.

5. Conclusion

In conclusion, acupuncture for dysphagia after stroke has therapeutic efficacy. And the acupuncture is safe and reliable within a certain range. More strict evaluation standard and high-quality RCT design are necessary for further exploration on the acupuncture for treatment of dysphagia after stroke.

Study or subgroup	Experimental Mean	SD	Total	Control Mean	SD	Total	Weight	Mean difference IV, random, 95% CI
Liu et al. 2012	2.96	0.55	36	3.24	0.57	36	22.5%	−0.28 [−0.54, −0.02]
Bai 2016	1.8	0.84	40	2.75	1.06	40	19.1%	−0.95 [−1.37, −0.53]
Jia et al. 2014	1.83	1.05	30	2.47	1.17	30	16.1%	−0.64 [−1.20, −0.08]
Wang and Cui 2011	2.2	0.35	70	3.25	0.53	70	24.2%	−1.05 [−1.20, −0.90]
Ding and Zhang 2013	2.26	0.87	30	2.85	0.96	30	18.2%	−0.59 [−1.05, −0.13]
Total (95% CI)			*206*			*206*	*100.0%*	*−0.71 [−1.08, −0.33]*

Heterogeneity: $\tau^2 = 0.15$; $\chi^2 = 27.51$, df = 4 ($P < 0.0001$); $I^2 = 85\%$

Test for overall effect: $Z = 3.70$ ($P = 0.0002$)

Mean difference IV, random, 95% CI

−10 −5 0 5 10

Acupuncture group Control group

Figure 11: The forest diagram of swallowing disorder integral.

Study or subgroup	Experimental Mean	SD	Total	Control Mean	SD	Total	Weight	Mean difference IV, random, 95% CI
Liu et al. 2012	2.96	0.55	36	3.24	0.57	36	0.0%	−0.28 [−0.54, −0.02]
Bai 2016	1.8	0.84	40	2.75	1.06	40	20.3%	−0.95 [−1.37, −0.53]
Jia et al. 2014	1.83	1.05	30	2.47	1.17	30	13.2%	−0.64 [−1.20, −0.08]
Wang and Cui 2011	2.2	0.35	70	3.25	0.53	70	48.8%	−1.05 [−1.20, −0.90]
Ding and Zhang 2013	2.26	0.87	30	2.85	0.96	30	17.7%	−0.59 [−1.05, −0.13]
Total (95% CI)			*170*			*170*	*100.0%*	*−0.89 [−1.13, −0.66]*

Heterogeneity: $\tau^2 = 0.02$; $\chi^2 = 4.99$, df = 3 ($P = 0.17$); $I^2 = 40\%$

Test for overall effect: $Z = 7.58$ ($P < 0.00001$)

Mean difference IV, random, 95% CI

−10 −5 0 5 10

Acupuncture group Control group

Figure 12: The forest diagram of SWAL-QOL.

Study or subgroup	Experimental Mean	SD	Total	Control Mean	SD	Total	Weight	Mean difference IV, fixed, 95% CI
Yi 2014	49.67	14.56	30	48	13.49	30	7.9%	1.67 [−5.43, 8.77]
Wang 2015	70.33	19.79	46	58.22	20.37	45	5.9%	12.11 [3.86, 20.36]
Qin 2015	64.69	10.64	30	58.44	11.91	30	12.3%	6.25 [0.54, 11.96]
Zhu et al. 2012	48.65	8.63	82	40.26	7.67	82	64.1%	8.39 [5.89, 10.89]
Zhou et al. 2014	90.16	14.71	30	85.33	10.16	30	9.8%	4.83 [−1.57, 11.23]
Total (95% CI)			*218*			*217*	*100.0%*	*7.46 [5.46, 9.47]*

Heterogeneity: $\chi^2 = 5.13$, df = 4 ($P = 0.27$); $I^2 = 22\%$

Test for overall effect: $Z = 7.31$ ($P < 0.00001$)

Mean difference IV, fixed, 95% CI

−100 −50 0 50 100

Control group Acupuncture group

Figure 13: The forest diagram of ADL.

Study or subgroup	Experimental Events	Total	Control Events	Total	Weight	Risk ratio M-H, fixed, 95% CI
Zheng 2014	28	30	23	30	50.0%	1.22 [0.98, 1.52]
Wang 2011	28	30	23	30	50.0%	1.22 [0.98, 1.52]
Total (95% CI)		*60*		*60*	*100.0%*	*1.22 [1.04, 1.42]*
Total events	56		46			

Heterogeneity: $\chi^2 = 0.00$, df = 1 ($P = 1.00$); $I^2 = 0\%$

Test for overall effect: $Z = 2.49$ ($P = 0.01$)

Risk ratio M-H, fixed, 95% CI

0.1 0.2 0.5 1 2 5 10

Control group Acupuncture group

Figure 14: The forest diagram of Caiteng 7 Rank.

Study or subgroup	Experimental Mean	Experimental SD	Experimental Total	Control Mean	Control SD	Control Total	Weight	Mean difference IV, random, 95% CI
Song 2012	8.53	1.8	30	7.93	1.62	30	52.4%	0.60 [−0.27, 1.47]
Ruan et al. 2015	9.32	0.79	25	7.51	2.45	25	47.6%	1.81 [0.80, 2.82]
Total (95% CI)			*55*			*55*	*100.0%*	*1.18 [−0.01, 2.36]*

Heterogeneity: $\tau^2 = 0.50$; $\chi^2 = 3.18$, df = 1 ($P = 0.07$); $I^2 = 69\%$

Test for overall effect: $Z = 1.95$ ($P = 0.05$)

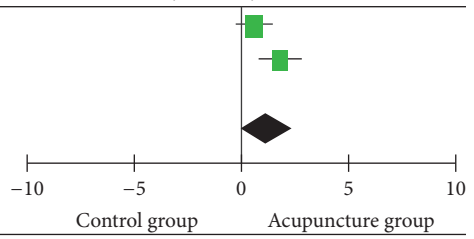

Figure 15: The forest diagram of IFRS.

Study or subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	Odds ratio M-H, fixed, 95% CI
1.4.1. Clinical efficacy rate						
Li and Bai 2015	27	32	19	30	12.6%	3.13 [0.93, 10.47]
Li et al. 2009	24	30	18	30	14.8%	2.67 [0.84, 8.46]
Wang 2016	28	32	22	30	11.7%	2.55 [0.68, 9.56]
Zhang et al. 2014	30	31	21	29	2.9%	11.43 [1.33, 98.34]
Subtotal (95% CI)		*125*		*119*	*42.0%*	*3.37 [1.75, 6.51]*
Total events	109		80			
Heterogeneity: $\chi^2 = 1.58$, df = 3 ($P = 0.66$); $I^2 = 0\%$						
Test for overall effect: $Z = 3.62$ ($P = 0.0003$)						
1.4.2. WST efficacy rate						
Liu 2014	30	34	23	34	11.1%	3.59 [1.01, 12.73]
Xie et al. 2011	37	65	20	65	35.4%	2.97 [1.45, 6.11]
Yin et al. 2011	15	18	20	25	11.5%	1.25 [0.26, 6.07]
Subtotal (95% CI)		*117*		*124*	*58.0%*	*2.75 [1.54, 4.91]*
Total events	82		63			
Heterogeneity: $\chi^2 = 1.17$, df = 2 ($P = 0.56$); $I^2 = 0\%$						
Test for overall effect: $Z = 3.42$ ($P = 0.0006$)						
Total (95% CI)		*242*		*243*	*100.0%*	*3.01 [1.95, 4.65]*
Total events	191		143			
Heterogeneity: $\chi^2 = 2.85$, df = 6 ($P = 0.83$); $I^2 = 0\%$						
Test for overall effect: $Z = 4.97$ ($P < 0.00001$)						
Test for subgroup differences: $\chi^2 = 0.21$, df = 1 ($P = 0.65$), $I^2 = 0\%$						

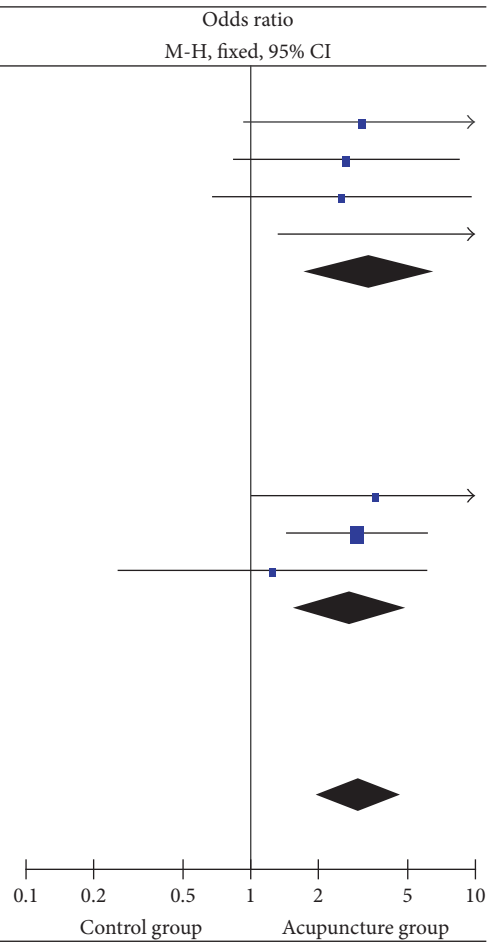

Figure 16: The forest diagram of single blind clinical efficacy rate.

Abbreviations

NIHSS: National Institutes of Health Stroke Scale
CT: Computerized tomographic scanning
MRI: Magnetic resonance imaging
SCI: Science Citation Index
CNKI: Chinese National Knowledge Infrastructure
CSJD: Chinese Scientific Journals Database
CBM: Chinese Biomedical Literature Database
CT7R: Caiteng 7 Rank
WST: Watian Swallowing Test
VFSS: Videofluoroscopy
ADL: Activity of Daily Life
IFRS: Ichiro Fujishima Rating Scale
WALQOL: Swallowing-Related Quality of Life.

Disclosure

Qiuping Ye is the first author. The funding agency was not involved in data collection, data analysis, data interpretation, or manuscript development.

Conflicts of Interest

The authors have no conflicts of interest to disclose.

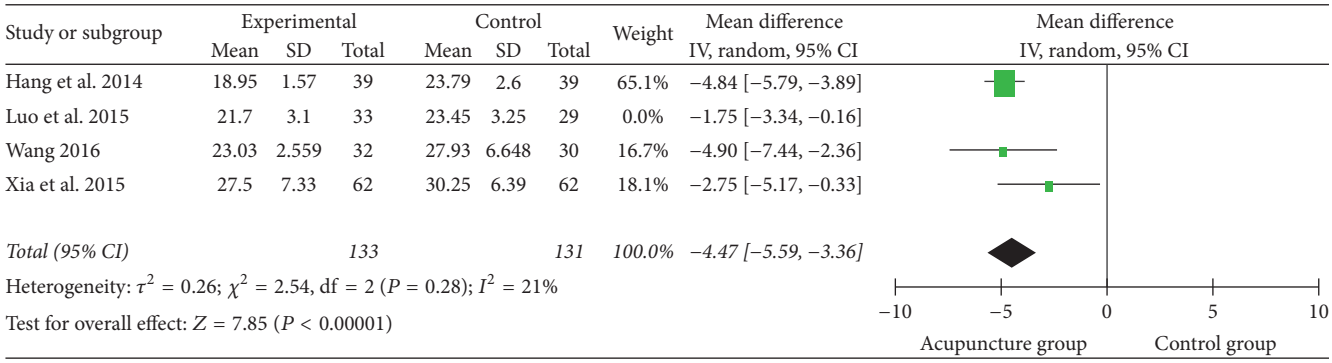

Figure 17: The forest diagram of single blind SSA.

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References

[1] M. Arnold, K. Liesirova, A. Broeg-Morvay et al., "Dysphagia in patients with brainstem stroke_ incidence and outcome," *PLOS ONE*, vol. 79, no. 2, pp. 170–175, 2000.

[2] D. G. Smithard, P. A. O'Neill, C. Park et al., "Complications and outcome after acute stroke: does dysphagia matter?" *Stroke*, vol. 27, no. 7, pp. 1200–1204, 1996.

[3] M. González-Fernández, L. Ottenstein, L. Atanelov, and A. B. Christian, "Dysphagia after stroke: an overview," *Current Physical Medicine and Rehabilitation Reports*, vol. 1, no. 3, pp. 187–196, 2013.

[4] H. Chang, Y. D. Kwon, and S. S. Yoon, "Use of acupuncture therapy as a supplement to conventional medical treatments for acute ischaemic stroke patients in an academic medical centre in Korea," *Complementary Therapies in Medicine*, vol. 19, no. 5, pp. 256–263, 2011.

[5] Z. Li F, "Research progress on acupuncture for dysphagia after stroke," *Journal of liaoning iversity of traditional Chinese medicine*, vol. 17, no. 8, pp. 210–212, 2015.

[6] J. He and Q. C. He, "The disscusion of clinical acupoint chosen rule and thorn moxibustion methods for acupuncture for dysphagia after stroke," *Chinese Journal of Rehabilitation Medicince*, vol. 23, no. 6, pp. 550-551, 2008.

[7] Z. W. Li, "The influence of acupuncture on the swallowing function of patients with apoplexy," *China's Traditional Chinese Medicine Emergency*, vol. 19, pp. 1609-01, 2010 (Croatian).

[8] A. Raglio, A. Zaliani, P. Baiardi et al., "Active music therapy approach for stroke patients in the post-acute rehabilitation," *Neurological Sciences*, vol. 38, no. 5, pp. 893–897, 2017.

[9] A. E. Arch, D. C. Weisman, S. Coca, K. V. Nystrom, C. R. Wira, and J. L. Schindler, "Erratum: Missed ischemic stroke diagnosis in the emergency department by emergency medicine and neurology services," *Stroke*, vol. 47, no. 3, pp. 668–673, 2016.

[10] Q. Sachiko and Q. Sun, *PracTical Technique for Rehabilitation of Feeding and Swallowing Disorders [M]*, vol. 43, Chinese medical science and Technology Press, Beijing, China, 2000.

[11] J. B. Palmer, K. V. Kuhlemeier, D. C. Tippett, and C. Lynch, "A protocol for the videofluorographic swallowing study," *Dysphagia*, vol. 8, no. 3, pp. 209–214, 1993.

[12] C.-H. Zhang, J.-L. Bian, Z.-H. Meng et al., "Tongguan Liqiao acupuncture therapy improves dysphagia after brainstem stroke," *Neural Regeneration Research*, vol. 11, no. 2, pp. 285–291, 2016.

[13] Saito., "Eiichi the treatment of strategic about ingestion and dysphagia," *J n. C G on the Mission of Medical*, vol. 41, no. 6, pp. 404–408, 2004.

[14] B. Martin-Harris and B. Jones, "The videofluorographic swallowing study," *Physical Medicine and Rehabilitation Clinics of North America*, vol. 19, no. 4, pp. 769–785, 2008.

[15] C. Kuo, C. T. Allen, C. Huang, and C. Lee, "Murray secretion scale and fiberoptic endoscopic evaluation of swallowing in predicting aspiration in dysphagic patients," *European Archives of Oto-Rhino-Laryngology*, vol. 274, no. 6, pp. 2513–2519, 2017.

[16] P. Chung and J. Ishii, "jas. Cerebrovascular handicap of acute stage," *Research of C*, vol. 28, no. 5, pp. 415–421, 2000.

[17] J. Luo, Z. L. Gu, and Z. H. Xu, "The effect observation of 'Tiao Shen li Yan' acupuncture for dysphagia after stroke," *Chinese Iournal of Physical and rehabilitation*, vol. 37, no. 12, pp. 940–942, 2015.

[18] W. Xia, C. Zheng, S. Zhu, and Z. Tang, "Does the addition of specific acupuncture to standard swallowing training improve outcomes in patients with dysphagia after stroke? a randomized controlled trial," *A randomized controlled trial Clinical Rehabilitation*, vol. 30, no. 3, pp. 237–246, 2015.

[19] Y. Xie, H. Liu, W. Zhou et al., "Effect of acupuncture on dysphagia of convalescent stroke patients," *Chinese Journal of Integrated Traditional and Western Medicine*, vol. 31, no. 6, pp. 736–740, 2011.

[20] Z. L. Yin, Z. X. Meng, and Y. J. Xie, "Swallowing training combined acupuncture and electrical stimulation treatment on stroke recovery excessie dysphagia," *Chinese Iournal of Physical and rehabilitation*, vol. 33, no. 12, pp. 916–919, 2011.

[21] R. Zhang, T. Li, and H. X. Chen, "Rev pharynx soup with acupuncture—rehabilitation treatment for dysphagia after ischemic stroke, a randomized controlled study," *Xinjiang Journal of Traditional Chinese Medicine*, vol. 32, no. 5, pp. 09-10, 2014.

[22] Q. L. Wang, *Tongue Three-Needle Combined with Neuromuscular Electrical Stimulation Treat Dysphagia after Stroke A Clinical Research*, Fujian University of Traditional Chinese Medicine, 2016.

[23] B. D. Li and J. Bai, "Clinical observation of 62 cases of post—cerebral hemorrhagic dysphagia treated with cortex—throat—tongue root sequence acupuncture therapy," *World Journal of Integrated Traditional and Western Medicine*, vol. 10, no. 6, pp. 812–815, 2015.

[24] C. F. Liu, *A study on the Effect of Acupuncture Combined with Rehabilitation for Stoke Patients with Swallowing Dysfunction in Acute Period*, Chengdu University of Traditional Chinese Medicine, 2014.

[25] F. Hang, X. Fu, and T. Wang, "The effect of oral placement therapy combined with acupuncture of specific points on dysphagia after stroke," *Chinese Journal of Rehabilitation Medicine*, vol. 29, no. 12, pp. 1129–1133, 2014.

[26] H. X. Li, G. R. Qiu, and D. P. Liu, "Clinical observation of acupuncture combined with rehabilitation training on dysphagia after stroke," *Journal of Shaanghai Acupuncture and moxibustion*, vol. 28, no. 7, pp. 388-389, 2009.

[27] Z. Q. Zhu, G. G. Xu, and Y. L. Guo, "Effect of acupuncture combined with stroke unit model for dysphagia after stroke," *Medical Journal of the Chinese People Armed Police Forces*, vol. 02, no. 10, pp. 144–149, 2012.

[28] L. Chen and G. M. Zhang, "Efficacy observation acupuncture and comprehensive rehabilitation project for treatment of dysphagia after stroke," *Journal of Emergency in Traditional Chinese Medicinevol.26*, vol. no.6, pp. 1111–1113, 2016.

[29] C. Chen, L. X. Yuan, and G. M. Zhang, "The clinical curative research effect of comprehensive acupuncture and moxibustion therapy on swallowing disorder after stroke," *Journal of Clinical Acupuncture and Moxibustion*, vol. 30, no. 5, pp. 8–12, 2014.

[30] X. L. Wang, *Clinical Research of Acupuncture Combined with Drug for Treatment of Dysphagia after Stroke*, vol. 4, Guangzhou University of Chinese Medicine, 2013.

[31] Y. B. Duan, "The observation standard of clinical effect for acupuncture combined with medicine for treatment of dysphagia after cerebral hemorrhage," *Cardiovascular Disease Journal of Integrated Traditional Chinese and Western Medicine*, vol. 4, no. 12, pp. 28-29, 2014.

[32] Y. H. Bao and C. Zou, "Clinical observation of acupuncture combined with medicine for treatment of dysphagia due to pseudobulbar palsy after stroke," *Zhejiang Chinese Medicine University*, vol. 25, 62, no. 3, p. 62, 2015.

[33] C. F. Fan, H. Y. Jiang, and L. Z. Wu, "Clinical observation on acupuncture treatment of dysphagia after stroke," *Shanghai Acupuncture and Moxibustion*, vol. 26, no. 7, pp. 6-7, 2007.

[34] S. W. Feng, S. H. Cao, and S. J. Du, "Randomized controlled study of acupuncture combined with swallowing training for treatment of dysphagia after stroke," *Chinese Acupuncture and Moxibustion*, vol. 36, no. 4, pp. 437–450, 2016.

[35] S. R. Zhen, L. Li, and W. Li, "'Jieyuliqiao'-Clinical observation acupuncture for treatment of dysphagia after stroke," vol. 10, no. 12, p. 1462, 2012.

[36] L. Chang, P. L. He, and Z. Z. Zhou, "Observation on therapeutic effect of acupuncture combined with functional electrical stimulation on dysphagia after acute stroke," *Chinese Acupuncture and Moxibustion*, vol. 34, no. 8, pp. 7737–7740, 2014.

[37] P. Wu, F. R. Liang, and B. L. Yu, "Effect of different intervention time of acupuncture and rehabilitation training on dysphagia after stroke," *Chinese Journal of Rehabilitation Theory and Practice*, vol. 17, no. 8, pp. 733–736, 2011.

[38] R. Y. Zhang and Y. D. Yin, "Clinical observation on the treatment of dysphagia after cerebral infarction with Bushen acupuncture," *Shanghai Journal of Acupuncture and Moxibustion*, vol. 31, no. 9, pp. 637–639, 2012.

[39] Q. H. Chen, "Clinical observation on the effect of the treatment of dysphagia in stroke patients with the combination of the single point of Lianquan and the case of modified oral cavity," *Chinese Medicine Modern Distance Education of China*, vol. 6, no. 6, p. 649, 2008.

[40] Z. N. Mao, T. Y. He, and L. Y. Mao, "Clinical study on the treatment of dysphagia after stroke by Professor HeYou Tian - target - acupuncture therapy," *annual meeting of Gansu Academy of traditional Chinese Medicine*, pp. 89–93, 2015.

[41] Y. J. Guo and A. Y. Li, "Six spring needling combined with the emotional nursing on dysphagia after ischemic stroke- a randomized controlled," *Journal of Clinical Acupuncture and Moxibustion*, vol. 32, no. 5, pp. 43–46, 2016.

[42] S. Gao, H. Z. Huang, and S. F. Li, "Effect of swallowing function training combined with acupuncture on dysphagia after stroke," *Hainan Medical Journal*, vol. 27, no. 15, pp. 2531–2533, 2016.

[43] H. Bai, "Effect of swallowing therapy combined with acupuncture on dysphagia after stroke," *Chinese Journal of Geriatric Care*, vol. 14, no. 1, pp. 102-103, 2016.

[44] B. J. Song, *China Academy of Chinese medical Science*, China Academy of Chinese Medical Science, 2012.

[45] Z. Zhou, Y. L. Zhang, and H. Yuan, "The clinical observation of 60 cases of scalp and body acupuncture treatment for dysphagia after stroke," *Lishizhen Medicine and Materia Medica Research*, vol. 24, no. 9, pp. 2160–2162, 2014.

[46] C. Liu, "Therapeutic effect of acupuncture combined with swallowing training on dysphagia after stroke," *Medical Recapitulate*, vol. 10, no. 11, pp. 2095-2096, 2014.

[47] B. D. Li, J. Bai, and W. B. Gao, "Effect of neck acupuncture combined with swallowing training on pharyngeal phase of dysphagia after stroke," *Chinese Journal of Physical Medicine and Rehabilitation*, vol. 33, no. 1, pp. 31-32, 2013.

[48] X. Wang, "30 cases of scalp acupuncture combined with body acupuncture treatment of dysphagia after stroke," *China's Naturopathy*, vol. 19, no. 5, pp. 14-15, 2011.

[49] Q. L. Li and H. D. Zheng, "The clinical observation standard on Tongue three needles of Jinjin and Yuye point for treatment of dysphagia after stroke," *Clinical Journal of Chinese Medicine*, vol. 6, pp. 49-50, 2014.

[50] K. R. Gu, *Evaluation of The Effect of Three Needles in The Treatment of Dysphagia after Stroke*, Gungzhou University of Chinese Medicine, 2011.

[51] N. Gao, H. P. Ma, and X. Z. Zhang, "Clinical observation on treatment of dysphagia after stroke by Tongue acupuncture and Swallowing therapy instrument," *Journal of Emergency in Traditional Chinese Medicine*, vol. 23, no. 2, pp. 265–267, 2014.

[52] H. H. Chen, *The Observation of Curative Effect of Tongue Acupuncture for Treatment of Dysphagia after Stroke*, Zhejiang University of Chinese Medicine, 2016.

[53] C. L. Ruan, C. J. Zhuang, and Z. Q. Huang, "25 cases of dysphagia after stroke treated by Tongguanliqiao acupuncture," *Fujian Journal of Traditional Chinese Medicine*, vol. 41, no. 1, pp. 31-32, 2015.

[54] Q. Wang, "Clinical study of Tongguanliqiao acupuncture therapy for dysphagia after stroke," *Shanghai Journal of Acupuncture and Moxibustion*, vol. 34, no. 8, pp. 721–723, 2015.

[55] B. N. E. B. Li, L. J. Tian, T. G. L. S. E. A, H. L. Yuan, and H. M. La, "The application of the tongqiaoxingnao acupuncture for treatment of dysphagia patients after stroke," *Journal of*

Emergency in Traditional Chinese Medicine, vol. 24, no. 8, pp. 2471–2473, 2015.

[56] J. H. Zhang, J. Y. Li, and Y. Zhao, "The clinical observation of Tongnaohuoluo acupuncture combined with swallowing training for treatment dysphagia after stroke," *Journal of Liaoning University of Traditional Chinese Medicine*, vol. 13, no. 12, pp. 188–191, 2011.

[57] F. Qu, *The curative effect observation of Jin Three-needle combined with rehabilitation training for treatment of dysphagia after stroke*, Guangzhou University of Chinese Medicine, 2009.

[58] X. M. Chen and H. J. Lin, "Xingnaokaiqiao acupuncture therapy for dysphagia after stroke in 59 cases," *Jiangxi Journal of Traditional Chinese Medicine*, vol. 8, no. 47, pp. 71–73, 2016.

[59] X. N. Gao and Q. X. Zhu, "Clinical observation of acupuncture treatment of four -pharyngeal ,for dysphagia after stroke of pseudobulbar palsy," *Clinical Journal of Chinese Medicinevol*, vol. 7, no. 1, pp. 54–57, 2015.

[60] D.-D. Liu, X. Tong, J.-Y. Kou, Y. Wei, T.-S. Yang, and L.-D. Qiao, "Influence of acupuncture on remodeling of swallowing functions for patients with pseudobulbar palsy after cerebral infarction," *Journal of Acupuncture and Tuina Science*, vol. 10, no. 1, pp. 44–48, 2012.

[61] S. Dong, H. B. Lv, and J. Q. Liu, "Clinical observation of acupuncture combined with swallowing function training on dysphagia (pharyngeal phase) after stroke," *Chinese Journal of traditional Chinese Medicine*, vol. 42, no. 2, pp. 129–131, 2014.

[62] Y. Zhang, "Effect of acupuncture combined with neuromuscular electrical stimulation on dysphagia after cerebral infarction," *Journal of Sichuan of Traditional Chinese Medicine*, vol. 32, no. 10, pp. 168–170, 2014.

[63] S. Li, J. S. E, and Y. Qin, "The effect of acupuncture combined with buccal muscle electrical stimulation on oral phase of dysphagia after stroke," *Chinese Journal of Rehabilitation Theory and Practice*, vol. 20, no. 3, pp. 221–223, 2014.

[64] Y. H. Wang and H. Y. Yang, "Study on the clinical curative effect of acupuncture on choke point combined with Kaiqiaoliyan stick and wallowing function training for dysphagia after stroke," *Clinical Journal of Chinese Medicine*, vol. 5, no. 9, pp. 41–43, 2013.

[65] N. Ding and S. Zhang, "Effect of nape acupuncture on swallowing function and TCD in patients with pseudobulbar palsy after ischemic stroke," *Medicine Information*, vol. 26, no. 5, 2013.

[66] Z. Fang, "The effect of acupuncture combined with Chinese medicine ice stimulation on swallowing function of patients with dysphagia after stroke," *Journal of Traditional Chinese Medicine*, vol. 55, no. 11, pp. 931–934, 2014.

[67] Y. Qin, *Clinical study on acupuncture of eight extra-meridians based treatment of dysphagia after stroke*, Chinese Medicine, Yunnan University of Traditional, 2015.

[68] S. Zhang and G. M. Zhang, "Treatment of 87 cases of dysphagia after stroke by acupuncture combined with swallowing rehabilitation training," *Anhui University of Chinese Medicine*, vol. 33, no. 5, pp. 56–59, 2014.

[69] B. B. Zhu and C. Y. Zhao, "Randomized parallel controlled study of acupuncture combined with swallowing training in the treatment of dysphagia after stroke," *Journal of Practical Traditional Chinese Medicine*, vol. 29, no. 11, pp. 152-153, 2001.

[70] R. T. Fu, "Treatment of 53 cases of dysphagia after stroke by acupuncture combined with routine treatment of cerebrovascular disease and rehabilitation therapy," *Traditional Chinese Medicinal Research*, vol. 29, no. 2, pp. 56–58, 2016.

[71] W. M. Zhang, P. Zheng, and W. Q. Zhang, "Standardization of acupuncture combined with rehabilitation training in the treatment of dysphagia after stroke," *World Journal of Integrated Traditional and Western Medicine*, vol. 2, no. 11, pp. 659–661, 2007.

[72] A. X. Wei and Y. L. An, "Clinical observation on 50 cases of dysphagia after stroke treated by acupuncture combined with swallowing function training," *World Journal of Integrated Traditional and Western Medicine*, vol. 7, no. 5, 2012.

[73] L. L. Yin, "Clinical study on acupuncture combined with rehabilitation therapy for 57 cases of dysphagia after stroke," *Journal of Traditional Chinese Medicine*, vol. 54, no. 9, pp. 766–768, 2013.

[74] L. P. Huang, L. L. Sun, and X. X. Zhang, "Clinical observation of acupuncture combined with rehabilitation training on dysphagia after stroke," *Shaanxi Journal of Traditional Chinese Medicine*, vol. 32, no. 3, pp. 329-330, 2011.

[75] L. R. Chen, Q. Lin, and L. Lin, "Therapeutic effect of acupuncture combined with neuromuscular electrical stimulation on dysphagia after stroke: a report of 28 cases," *Journal of Fujian University of TCM*, vol. 21, no. 6, pp. 54-55, 2011.

[76] L. Wang and Y. Cui, "Clinical observation on 70 cases of dysphagia after stroke treated by acupuncture combined with pulse electrotherapy," *Journal of Traditional Chinese Medicine*, vol. 52, no. 24, pp. 2112–2114, 2011.

[77] A. Y. Li, "The curative effect observation of Quan point acupuncture combined with acupoint massage for treatment of dysphagia after stroke which was complicated by pulmonary infection," *Journal of Emergency in Traditional Chinese Medicine*, vol. 25, no. 9, pp. 1783–1785, 2016.

[78] C. X. Yi, *The clinical efficacy observation of Rendu meridian acupoints combined with the stroke unit for treatment of dysphagia after stroke*, Hunan University of Chinese Medicine, 2014.

[79] L. Jia, D. Liu, and J. Bai, "Effect analysis of four-choke acupuncture combined with rehabilitation therapy for dysphagia after stroke," *Contemporary Medicine*, vol. 20, no. 36, pp. 1-2, 2014.

[80] X. S. Huang, Q. Tian, and R. Y. Mo, "A randomized parallel controlled study of acupuncture for treatment of moderate to severe dysphagia in stroke patients," *Journal of Practical Traditional Chinese Internal Medicine*, vol. 27, no. 2, pp. 143-144, 2013.

[81] X. E. Feng and L. Sun, "Observation on therapeutic effect of acupuncture on dysphagia after stroke: a report of 30 cases," *China Health Standard Management*, vol. 7, pp. 149–151, 2016.

[82] Q. Chen, W. G. Xia, and B. G. Chen, "Clinical study on acupuncture treatment of dysphagia caused by pseudobulbar palsy after stroke," *Nei Mongol Journal of Traditional Chinese Medicine*, vol. 05, no. 11, pp. 118-119, 2015.

[83] W. X. Feng, P. Li, and Y. M. Min, "Acupuncture treatment of dysphagia after stroke: a report of 45 cases," *Shaanxi Journal of Traditional Chinese Medicine*, vol. 36, no. 1, pp. 91-92, 2015.

[84] Z. H. Yu and J. F. Hu, "78 Cases of Acupuncture Combined with Rehabilitation Training in The Treatment of Dysphagia after Stroke," in *Proceedings of The 2011 Annual Meeting of The Chinese Society for Acupuncture And Moxibustion*, pp. 55–58, 2011.

[85] Y. Z. Zhao and H. Zhang, "Observation on therapeutic effect of acupuncture combined with swallowing therapy on dysphagia after stroke," *Shanxi Journal of Traditional Chinese Medicine*, vol. 28, no. 5, pp. 29-30, 2012.

[86] W. J. Yu, M. X. Zhang, and C. M. Sun, "Acupuncture for dysphagia after stroke: a report of 30 cases," *Journal of Clinical Acupuncture and Moxibustion*, vol. 28, no. 12, pp. 21–23, 2012.

[87] D. Zheng, *Clinical Study of Scalp Acupuncture Combined with Rehabilitation Training for Treatment of Dysphagia after Stroke*, Gungzhou University of Chinese Medicine, 2014.

[88] L. P. Wang and Y. Xie, "Systematic evaluation on acupuncture for treatment of dysphagia after stroke," *Chinese Acupuncture*, vol. 26, no. 2, pp. 141–146, 2006.

[89] D. Meng, Y. B. Shang, Y. F. Fu et al., "Clinical literature study of acupuncture and moxibustion in the treatment of post-stroke dysphagia based on meta analysis," *Chinese Medicine Modern Distance Education of China*, vol. 16, no. 64, pp. 148–153, 2016.

[90] Y.-B. Long and X.-P. Wu, "A meta-analysis of the efficacy of acupuncture in treating dysphagia in patients with a stroke," *Acupuncture in Medicine*, vol. 30, no. 4, pp. 291–297, 2012.

[91] M. M. B. Costa, "Videofluoroscopy: The gold standard exam for studying swallowing and its dysfunction," *Arquivos de Gastroenterologia*, vol. 47, no. 4, pp. 327-328, 2010.

[92] J. Zhang, Y.-J. Wang, and T. Cui, "Reliability and validity of nine rating scales for dysphagia following stroke," *Chinese Journal of Clinical Rehabilitation*, vol. 8, no. 7, pp. 1201–1203, 2004.

[93] J. W. Wu, X. Bi, and L. Song, "Value of applying water swallowing trst for patients with dysphagia after acute stroke," *Journal of Shanghai Jiao Tong University(Medical Science*, vol. 36, no. 7, pp. 1049–1053, 2016.

[94] S. Zhang, B. Wu, M. Liu et al., "Acupuncture efficacy on ischemic stroke recovery: multicenter randomized controlled trial in China," *Stroke*, vol. 46, no. 5, pp. 1301–1306, 2015.

[95] J. Liu, S. N. Li, L. Liu et al., "Conventional acupuncture for cardiac arrhythmia: A systematic review of randomized controlled trials," *Chinese Journal of Integrative Medicine*, pp. 1–9, 2017.

[96] Y. Cai, C. S. Zhang, S. Liu et al., "Electro-acupuncture for post-stroke spasticity: a systematic review and meta-analysis," *Archives of Physical Medicine and Rehabilitation*, 2017.

[97] H. J. Lee, Y. Kim, and W. Y. Kim, "Safety concerns with thoracoabdominal acupuncture: experience at a tertiary-care emergency department," *Pain Medicine*, 2017.

[98] Q. Y. Li, Y. Y. Liu, J. Zhang et al., "Analysis of the adverse reactions of acupuncture and acupuncture accidents," *Chinese Acupuncture and Moxibustion*, vol. 8, no. 31, pp. 0255–0930, 2011.

[99] D. Moher, K. F. Schulz, D. G. Altman, and L. Lepage, "The CONSORT statement: revised recommendations for improving the quality of reports of parallel-group randomized trials," *Annals of Internal Medicine*, vol. 134, no. 8, pp. 657–662, 2001.